

A PUBLICATION OF THE SAMUEL ROBERTS NOBLE FOUNDATION

# LEGACY

FALL 2013



## LOOKING BACK. GROWING FORWARD.

Just shy of a century old, Collier Farms continues to advance with a little help from the Noble Foundation.



THE SAMUEL ROBERTS  
**NOBLE**  
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# When you sit down to dinner, remember to thank a farmer.

Farmers and ranchers made this meal possible, because they make every meal possible. Their dedication supports all of us, and the Noble Foundation supports them. For almost seven decades, the Noble Foundation has provided education and expert counsel to agricultural producers, developed hardier plants for their fields, and conducted industry-shaping research to advance agriculture. It's the least we can do, considering all the dinners they've made possible for us.

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A smoky haze surrounds a tree during a prescribed fire conducted by the Noble Foundation.



# Pure Imagination



By now most everyone has seen the Chipotle Mexican Grill commercial.

You know, the one with a sad scarecrow in a dystopian future rebelling against mass processed food by opening his own wholesome “Chipotle” style stand, while Fiona Apple mournfully croons “Pure Imagination” in the background.

This is supposed to be Chipotle’s profound statement about today’s food production and big agriculture.

It’s not.

It is strategic marketing gone awry. It is irresponsible and baseless. And it is mostly about making money for a business that requires a steady stream of customers.

Chipotle is capitalizing on our society’s growing association of farm products popularly labeled “free-range,” “organic” and “all natural” as healthier. So, leveraging this easy target, they laid waste to the facts.

Six million YouTube views and a tsunami of free publicity later (worth millions of dollars) and you have yourself a successful advertising campaign, a dangerous, reckless advertising campaign.

The commercial shows cattle and pigs on factory conveyor belts being liquefied and served to children. Another shot shows a chicken being plunged with a caulk-gun-sized syringe that inflates its size. Dairy cows, with puppy dog eyes, are milked in metal boxes in a dark factory.

This horrifying misrepresentation will permanently shape perceptions about agriculture for those who have little

connection to their food. They will believe this is how it is produced. They will never know the pride, skill and endless effort our farmers and ranchers demonstrate every day to produce the highest quality and safest food supply in the world.

Instead of an honest dialogue about food production, this video opted for a scorched earth approach. Facts about food production be damned. They demonized all producers, large and small, and related entities that work to feed us. They tore down agriculture just to build up their own image.

We – as a society – have to come to this conclusion: there is room at the table for all types of agriculture in this world. We have to stop throwing elbows at each other and work together.

Here’s the bottom line: The ad is a gross overreach. It’s a perversion of fact. And it’s damaging. But it’s  *dang*  good marketing, and it will probably make them more money. Sad.

They’ve traded in a chance to discuss the real issues surrounding agriculture – lack of research funding, aging producer population and tighter government restrictions – for a cheap buck. Sounds like something a big company would do. Maybe we should make a commercial about that. I wonder if Fiona Apple is available for the soundtrack?

Sincerely,

A handwritten signature in black ink, appearing to read "Bill Buckner".

Bill Buckner, President and Chief Executive Officer

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# Noble Spotlight

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## OKLAHOMA NEWSPAPER SELECTS ROHLA AS ONE OF 39 YOUNG LEADERS IN STATE

Noble Foundation Assistant Professor Charles Rohla, Ph.D., was named one of 39 Oklahoma young leaders in The Journal Record's 2013 Achievers Under 40. Rohla was nominated for this award because of his contributions to the pecan industry through research, education and leadership. His primary research focuses on increasing pecan production through improved establishment methods, reducing alternate bearing and nutrient management.



## AGRICULTURAL EVENTS CAP SCHOOL YEAR

This spring, the Noble Foundation hosted two special youth educational events for more than 300 students from Oklahoma. One event, Ag Safety Day, taught children how to stay safe and healthy on the farm and at home.

The other event, Science in Ag Day, focused on the stewardship of natural resources and the impact that agriculture has on almost every facet of society from food production to the overall economy.

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## PHOTO CONTEST

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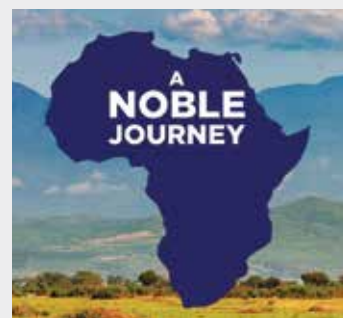


The Noble Foundation asked photographers in the Great Plains to submit photos for its 2014 agricultural calendar. Winners will be announced in December at [www.noble.org/2014calendarcontest](http://www.noble.org/2014calendarcontest). Submissions for the 2015 calendar will begin Nov. 1, 2013.

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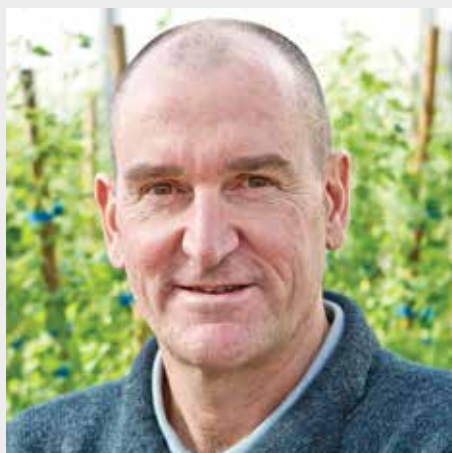
## JOURNEY BLOG

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The Noble Foundation is supporting a growing agricultural program of Watoto Child Care Ministries, a Ugandan mission-based program caring for 3,000 orphaned children. Noble is enabling U.S. graduate students to participate in semester-long ag experiences in Uganda. Read one Watoto experience at [www.noble.org/blog/a-noble-journey](http://www.noble.org/blog/a-noble-journey).





## NEW DIRECTOR TAKES REINS

Michael Udvardi, Ph.D., was appointed senior vice president and director of the Plant Biology Division this spring. Udvardi has served as the interim director since November when the division's founding director, Richard Dixon, D. Phil. began his retirement process after 25 years.

Udvardi earned his doctoral degree in biochemistry from the Australian National University in 1989.

He was an associate professor at Germany's Max Planck Institute before becoming a Noble Foundation principal investigator and professor in 2006. Udvardi researches the molecular genetic basis of plant processes.



## SUMNER RECEIVES HONOR

Noble Foundation Professor Lloyd W. Sumner, Ph.D., was named a lifetime Honorary Fellow of the Metabolomics Society. Only two Honorary Fellowships are awarded each year.

Sumner was elected as an Honorary Fellow for his work to help establish the Metabolomics Society and for his research in plant metabolomics. Sumner has served as president and treasurer of the society.

Sumner's research focuses on the development, advancement and implementation of instrumental techniques for large-scale profiling and identification of the functional products of gene expression, specifically proteins and metabolites.

## SOCIAL MEDIA



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## Legacy

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*Legacy* is published by the Department of Communications at The Samuel Roberts Noble Foundation. Headquartered in Ardmore, Okla., the Noble Foundation is an independent, nonprofit institute conducting plant science research and programs to enhance agricultural productivity. *Legacy* offers insight into the outstanding scientists and agricultural consultants who pursue the vision of founder Lloyd Noble.

### Reprints

Reprint requests may be made by contacting J. Adam Calaway, Director of Communications, at 580.224.6209 or by email at [jacalaway@noble.org](mailto:jacalaway@noble.org).

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ISSN: 1939-5035

## TIP OF THE DAY

Fall is an excellent time to plant container-grown trees. Container-grown trees tend to establish better when fall-planted because they can generate new roots while soil temperatures are still relatively warm. This additional growth accelerates establishment and ensures the trees get off to a quick start come spring.

# What is the best advice you have ever been given?

I respect my father probably more than anyone else I know. His life is built on faith, love and good old-fashioned hard work. He gave me this piece of wisdom: "If something is worth doing, then it is worth doing right." Remembering that has helped me to let go of things that are not worth my time and focus on making the others count.

**Katelyn Kuck**  
Summer Research Scholar

One of my best pieces of advice came from a fellow laboratory member at the University of Tennessee, Knoxville: "If you get up each morning and are genuinely curious as to how something works and go searching for those answers – each day will be rewarding." It never hurts to do what you are passionately curious about.

**Connor Gorman**  
Summer Research Scholar

As a kid, we had a rule in my house: once you started something, you finished it. If I wanted to quit, my parents strongly encouraged me to continue. This rule seemed unfair at times. However, looking back now, I realize this instilled in me a mindset of perseverance, a strong work ethic and a sense of purpose that has made me into the person I am today.

**Andrew Scruggs**  
Scholar in Agriculture

No matter what anyone else says or thinks about you, go hard after your dreams. It's better to look back and say, "I gave it my best shot" than to look back and say, "I was too afraid to try."

**Summer Clifton**  
Scholar in Agriculture





# DEBUNKING GMOs

The first genetically modified plant was created in 1983. In the following three decades, technology improved exponentially, and now dozens of plants have been infused with outside genes to bring new stress resistance, increased biomass and improved nutritional qualities to these genetically modified organisms (GMOs). Although most processed foods in the U.S. now contain GMOs, many still fear the technology and perpetuate myths about the genetic modification of plants. Following are answers to some of the commonly held beliefs about GMOs.



**Myth:** GMOs are limited to a handful of countries.

**Fact:** GMOs can be found worldwide in 29 countries (10 industrial, 19 developing).

## Top 10 countries growing GMO crops:

### United States

Accounts for **43%** of biotech crops worldwide.



### Argentina



### India



### Canada



### Pakistan



### Paraguay



### China



### Brazil



### South Africa



### Uruguay



Crops include maize (corn), soybeans, cotton, canola, beets, papaya, tomato, sweet pepper, poplar



A record **90%** of U.S. corn crop is genetically engineered.



-USDA -Greenwire  
Source: Greenwire (10 Jul 2013)

**Myth:** GMOs make up a small percentage of total crops.

**Fact:** 80 percent of processed foods in the U.S. contain a GM crop.

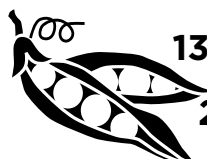
## 2012: U.S. GMO crop expansion and uses (approximate percentages)

### Corn: 86% of 96 million acres



**45%** - animal feed  
**18%** - exported overseas  
**28%** - fuel ethanol  
**9%** - food or ingredients for food products

### Soybeans: 93% of 76 million acres



**85%** - processed into meal and oil  
**13%** - meal used in animal feed  
**2%** - soy flour and proteins

### Cotton: 95% of 12.6 million acres



**91%** - apparel and home furnishings  
**9%** - industrial product, cottonseed oil and cottonseed meal

**Myth:** Eating GMOs will hurt me.

**Fact:** No adverse effects have been documented in food made from biotech crops.

## A study of 1,200 Americans showed:

### 48% of Americans

are aware that such products are currently for sale in supermarkets.

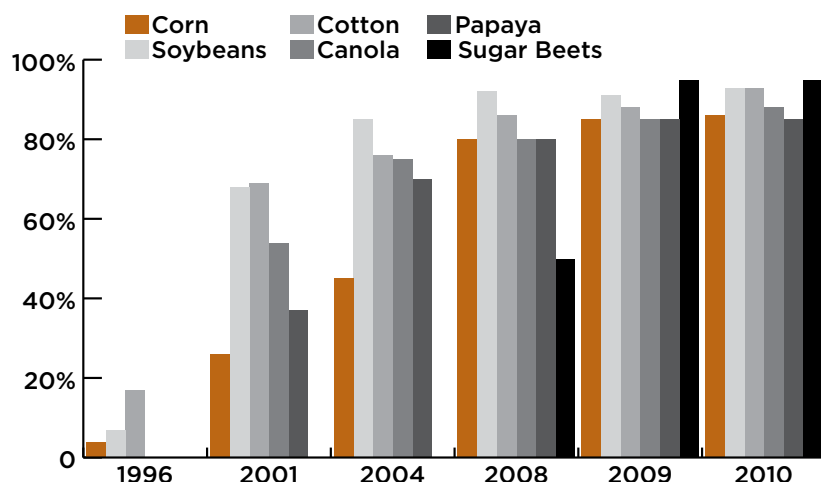
### 87% incorrectly

believe that people have had allergic reactions to GM food.

### 56% incorrectly

believe that a large fast-food chain used chickens so altered by genetic modification that they are not considered chickens anymore.

U.S. expansion timeline: % acreage GM of total for the crop



### 31% realize

they regularly consume GM foods.

### 79% incorrectly

believed that GM tomatoes are available.

### 45% understand

that eating a GM fruit will not cause their own genes to become modified.



Principal Investigator Kelly Craven, Ph.D., (right) examines orchids in the Noble Foundation greenhouse with Postdoctoral Fellow Prasun Ray, Ph.D.





# An orchid by any other name

**Fungi found in the roots of a particular orchid may hold the key to advancing agriculture**

*by Kim McConnell*

The delicate pastel petals of the orchid have a lot in common with the rugged, rangy switchgrass of the Great Plains – at least in Kelly Craven’s laboratory.

Craven, Ph.D., an assistant professor

at the Noble Foundation, is exploring the idea of enhancing the growth of switchgrass with orchids. Or rather, the roots of the orchid and the fungi that dwell there, co-existing in a relationship

that benefits both plant and fungus.

Expanding this naturally occurring symbiotic relationship to other plants could enhance their growth, increase crop yield, and improve productivity ►



Prasun Ray, Ph.D., cuts *Medicago truncatula*, which hosts a beneficial fungus being studied.

and crop economics. The impact could be a boon to both food sustainability and the energy sector. In one particular application, a switchgrass-fungi combination might enhance the economics of this crop, making it more productive and less costly to refine into advanced biofuels.

"In the next century, we have to produce more with less: less arable land, less water and less fertilizers," Craven said. "The population is predicted to increase by three billion people by the end of the

century. In combination with plant breeding approaches at the Noble Foundation, we're developing plants that have higher yields or grow better under a greater variety of environmental conditions. Mother Nature has already provided us examples through some of these symbiotic relationships. Now we want to use them in new crops."

The ultimate goal of Craven's research is to produce crops with the best characteristics that will grow on the least amount

of land. That's where the delicate orchid comes into play. Orchids, you see, rely on fungi enmeshed in their roots, a symbiotic relationship of a type that Craven said scientists believe stretches back to the time when plants first colonized land.

"Fungi are used commonly by plants in nature. In fact, it's thought that they've been associated with plants since the first plants emerged from the sea," said Craven, explaining that in 460-million-year-old fossilized specimens, scientists have found evidence of fungi in the roots. They theorize that these fungi – called arbuscular mycorrhizae (AM) – played a key role in facilitating the transition from the ocean to the land because they provided critical mineral nutrition. "When you think about what the landscape looked like before vegetation, it was rock. These fungi were able to break down these rocks to produce mineral nutrition."

## FUNGI AND AGRICULTURE

The research into fungi and agriculture-based plants isn't new. Researchers have known for decades that mycorrhizal fungi are vital to an orchid's development, so vital that orchid seeds can't germinate without them and some types of orchids remain incapable of photosynthesis for their entire life span. In these instances, the fungus provides not only mineral nutrition, but carbon as well.

Craven is attempting to develop improved switchgrass, using the fungi to bring super-charged benefits to its new host. He said that often, biomass gains to one part of the plant come at the expense of other parts. For example, gains above-ground (the shoot) typically would mean a lower density below ground (roots).

"In this novel symbiosis, we see an expansion of both systems," he said, noting the potential benefit of improving a plant that already has an enviable root system (a yard of roots for every foot of shoot) and towering height (up to 10 feet).

"If we can get more biomass per acre out of switchgrass, you need less land to produce it," Craven said. "Since it's a native grass of the Great Plains, it has adapted to life in the weather-challenged area and already tolerates drought well. We want to use it as a bioenergy crop, but also use it to anchor soil, which could have important range, pasture and conservation applications."

That dual role could be critical,





The fungus that naturally occurs in orchids, such as this one, has been successfully transferred to switchgrass, resulting in increased biomass.

because the plant would have an ecology-based use (not only do the roots anchor soil, they contribute organic carbon to it) and would be a perennial crop whose cellulose could be transformed into ethanol or other advanced biofuels.

Think of corn as a first-generation biofuel, whose starch is easily converted into ethanol. But that crop is relatively expensive to produce; requires good, arable land; and its use as fuel can influence food prices. "It is controversial," Craven said simply. "Finding an option for cellulose-based fuel production, rather than relying on the ethanol fuel produced from corn, would return good farmland to food and feed production."

Cellulosic biofuel, a second-generation biofuel, and next-generation advanced biofuels provide energy via cellulose (what plant cell walls are made of).

#### SPECIFIC ORCHID FUNGI

To help improve switchgrass (as part of

research to advance the Department of Energy's national biofuels initiative), Craven's laboratory has pinpointed a particular group of orchid fungi (the Sebaciniales order). Recent research conducted by outside laboratories suggested these fungi may have broad host ranges. In essence, they have the ability to interact with many plants instead of being host-specific.

Craven wanted to see if they could take the culturable orchid fungi and infect switchgrass. They successfully completed this experiment last year. The match worked, proving just how adaptable these particular orchid fungi can be. Additionally, the results revealed that the fungi-infused switchgrass had three times the biomass. But switchgrass was just the beginning.

"We can take the orchid fungi and infect every plant we've tried so far," Craven said. "That includes *Arabidopsis thaliana*, a plant species that even the AM fungi, renowned for their broad

host range, cannot colonize." *A. thaliana* belongs to the plant family Brassicaceae, whose members typically lack key genes that are known to regulate symbiosis with both AM fungi and nitrogen-fixing bacteria (rhizobia).

"The fact that we can infect *A. thaliana* with these orchid fungi suggests that they colonize the roots through an entirely different pathway than either AM fungi or rhizobia" Craven said. "That's a fascinating aspect of the basic biology that may ultimately challenge notions of how plants enter into symbiosis and may also open up new avenues for incorporation of these partnerships into new agricultural crops."

However, there's a hitch. While these particular fungi can be cultured out of their orchid hosts, attempts to culture similar strains out of other plants proved unsuccessful, even though tests showed such fungi were present within the plants. "We know it is there, but if the fungi are not derived from an orchid, it can't be cultured [and grown outside the plant]," Craven said. "This is a problem because it currently limits the strains at our disposal. However, as we learn more about the basic biology of the interaction using the genetic tools available for *A. thaliana* and *Medicago truncatula*, we believe we can overcome this challenge and decipher how to entice the non-orchid strains out of their host plants."

There also is the broader potential application for the orchid fungi. Craven has initiated a study of their impact on valuable food crops like wheat, oats and soybeans. So far, the findings have been encouraging. Craven's team has been able to colonize each of the crops. Among its many positive attributes, these fungi serve as an extension of the plant's root system, helping to improve nutrient acquisition from the soil and sustain growth.

"In general, plants depend on microbes. You can't find a plant in nature that lacks symbiotic microbes," Craven said. "The plant depends on them the most in times of stress like weather extremes, including drought. We are simply taking advantage of solutions forged over eons of evolution and maximizing their effects in ways that benefit agricultural production for a growing population in a world of dwindling agronomic resources and extreme climatic variability."

Not bad for a little orchid. ■





# Carolyn Young

by Jessica Willingham

As it turns out, mycologists have a wicked sense of humor. If you meet Carolyn Young on the right day, she might be wearing one of her favorite t-shirts. It's dirt brown and has a picture of a mushroom with the phrase, "I'm a fun guy." Serious research can come from fun researchers in Young's world.

A native of New Zealand, Young leads a mycology lab at the Noble Foundation with the goal of producing improved forage grasses, a staple of grazing livestock. Thanks to a fungus that lives within tall fescue – Young's forage focus – the grass can better withstand the trials of drought and disease. Capitalizing on this symbiosis has become the focus of Young's research team and her passion.

Young, 46, is the first of her family to graduate college. She originally attended a vocational school to study science, and then she went on to earn her degrees, a bachelor's, master's and doctoral, from Massey University in New Zealand. Since coming to Noble in 2006, she has worked as a principal investigator and was recently promoted to associate professor. Her husband, David McSweeney, oversees the organization's greenhouses. Together, these Kiwis are giving the Foundation a New Zealand kick.

Young is at the height of her career, but insists the fun isn't over. Below, she discusses gin, genomics and growing up in the family business.

## What are endophytes?

Endophytes are microorganisms (fungi or bacteria) that live inside plants. Most people associate fungi with mushrooms or moldy food, but the fungal endophytes I work with can protect some of the grasses we use as forage for grazing animals by providing mechanisms, like drought tolerance or resistance to some insects.

## What impact do endophytes have on animals?

Unfortunately, some aspects of the endophyte can be harmful to livestock. Certain strains of endophyte cause fescue toxicosis, an illness caused when livestock ingest an ergot alkaloid.

Some people believe that a similar fungus commonly known as "ergot" infecting rye was responsible for the strange events surrounding the Salem witch trials.

## So how does your lab use endophytes?

My laboratory finds endophytes that benefit the grasses, but are not toxic to livestock. We inoculate beneficial endophytes into plants and then work with plant breeders to develop new varieties with better persistence for the Oklahoman climate. I have also developed a quality assurance program to ensure the new varieties contain the right endophyte that is valuable to farmers when grown in the field.

## Did you always want to be a scientist?

I wanted to be so many things growing up – first a flight attendant, then a vet, then a social worker. Then I didn't have a clue, but I did enjoy my chemistry class. To me, a scientist was a person in a lab coat, geeky glasses and a funny haircut. I couldn't have been more wrong. Science is a dynamic career with dynamic people. I love what I do. I'm excited to see results and figure out what they mean, even if they don't always fit my hypothesis.

## Most people don't associate research and agriculture. Did you expect your career to lead to agriculture?

It still surprises me that I'm involved in agriculture since I didn't grow up in a farming background. But recently it dawned on me that agriculture is really our family business. My father was a butcher, my brother used to shear sheep, and I work out how to feed livestock. No one in my family went to a university, so I had nothing to draw on in terms of career path, like families of doctors or lawyers or teachers. But when I stop and think what we have in common as a family, the common thread is agriculture.

## What's the biggest risk you ever took?

I took a position as a postdoctoral fellow in Wooster, Ohio. David quit his fabulous job. We sold our house, packed our belongings

into eight suitcases, gave away everything else and moved our family to America. Our monthly income dropped to 25 percent of what it once was, but David and our sons, Patrick and Oliver, then 12 and 2, believed in me. Fourteen months later, I started my own lab at the Noble Foundation.

## How was adjusting to a new country?

We grew up watching a lot of American television, but we were still surprised when we moved here. The school buses really are yellow ("The Simpsons"), and high schools really have cheerleaders, pom-pom squads and marching bands (most American movies). Most people see Ardmore and even Oklahoma as small and untamed, but it's a nice place to live with great people and lots of space. It gives me energy.

## What's the best advice you ever took?

I'm not sure if this was the best advice, but it sure was memorable. My Aunt Jane told me it's better to drink beer than gin and tonic if you want to stay out of trouble. I have loved beer ever since, and it's one of my favorite fungi-based products. If I weren't a scientist, I would follow my father's retirement footsteps and run a country pub in New Zealand. You would all be welcome to visit, and I'd shout the first round.

## What are your plans for the future?

Professionally, I want to embark on a new wave of research – comparative genomics. I want to discover what beneficial endophytes have in common genetically to see what makes them successful and what differences make one more successful than another. The Noble Foundation is an amazing place to work because there are excellent resources and facilities to do quality research. While I get to explore the wonders of endophytes, I'm doing it for a reason – to benefit agriculture.

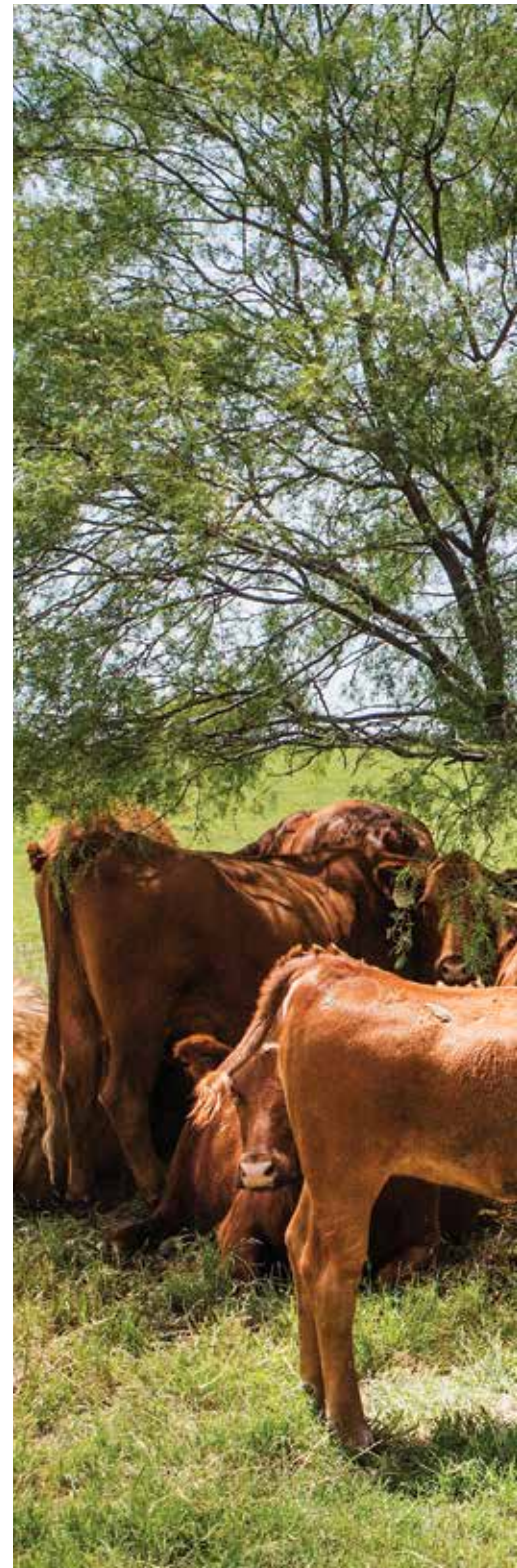
## What about personally?

I have finally decided I want to be a United States citizen. I'm ready to make that change, and that's a big step. But I'll always be a Kiwi at heart. ■





Rancher and consultation client Carroll Collier (left), discusses his operation with Noble Foundation consultants Robert Wells, Ph.D., (center) and Dan Childs (right).



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Looking back.  
Growing forward.

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Cattle seek shade under a mesquite tree on Collier's ranch.



Carroll Collier smiles broadly during a farm visit by Noble Foundation consultants.

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Just shy of a century old, Collier Farms continues to advance with a little help from the Noble Foundation.

*by Caitlin Powers*

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Visiting Carroll Collier's ranch is a journey into the past and a look into the future.

The healthy pastures flanking the roads leading to Collier Farms still spring from the same Wise County soil plowed by Collier's grandfather, but their vitality stands as a testament to today's newest technologies and farming practices.

Rustic cedar fences from yesteryear and this season's pink Knock Out® roses line the drive to a simple house with a small front porch and a white, wood-framed screen door. The thumping bass of Elvis' "You ain't nothin' but a hound dog" comes pouring through, only slightly muffled by the rustle of a breeze through the trees.

Then there's Collier – a model of the modern rancher, so willing to try new ideas, so proud of the history that has brought him to this point. "My grandfather did a wonderful job with what he had to

work with. He didn't have anything really – no resources to speak of – compared to what we have today," Collier said. "We have worked hard to continue his legacy and keep this land going, to improve it. This place is a part of our past, and it's our future."

### 1965 WAS A GOOD YEAR

Collier's grandfather, Guy Collier, founded the family farm in the early 1920s. He produced peanuts and cotton before shifting the operation to hog and beef production. Guy purchased additional land through the decades, piecing together acreage until it reached the current 318-acre homestead.

Collier bought the farm from his grandfather's estate in 1965, the same year he married his wife, Jean, whom he credits with years of co-stewardship. "After we married, he started making improvements on this place every year, and he still is," Jean said, with a proud smile. "I've been

there every step of the way. I am just as proud of this place as he is."

Collier Farms has changed with the times, from growing various crops to now strictly being a beef cattle operation. Through the years, Collier has maintained other jobs to help keep the ranch growing. He has run a retail supply store, a peanut buying point and a dairy. But today, with a little help from the Noble Foundation, Collier only needs to worry about his cattle.

The Noble-Collier relationship began in 2005 as Collier transitioned full-time to the beef cattle business. He needed a little help and discovered the Noble Foundation. Collier had "known about the Noble Foundation for years," but became actively involved with the organization after attending seminars in his home county.

The Noble Foundation's no-cost consultation program has offered Collier, along with thousands of other farmers, ranchers and land stewards, a unique





resource that provides counsel and education to help producers be successful and sustainable.

"Working with the Noble Foundation changes everything," Collier said. "If you have a question about any topic, you just call them and they'll help you figure out an answer. It's like having a best friend whom you trust and is an expert in agriculture."

### **100 PERCENT, ABSOLUTELY 100 PERCENT**

Collier's relationship with the Noble Foundation has impacted almost every aspect of his operation, from the cattle he selects to the grass they graze.

These days, Collier runs three cow-calf herds on several pastures of bermudagrass, rye and native grasses, a system carefully discussed with Noble Foundation consultants.

"We took a hard look at how we manage our pastures, especially during this latest drought," he said. "Years like that make you work a little harder, but we made it through with some help from Noble."

One of his primary goals is to maintain not just quality pastures, but to stock hay to reduce expenditures. Inside his barn are nearly 20 bales of hay from last year, still as good as the day he stored them, another product of Collier's dedication and Noble's resources.

"Over the years, we have worked hard to find ways to stockpile and maintain the quality of our grass so we can keep our hay feeding costs to a minimum," Collier said.

Through the years, Noble Foundation agricultural consultants have assisted Collier with soil samples, forage samples, proper feeding management and expense

tracking. He now uses cattle record keeping software to improve the business and cattle management aspects of his ranch.

"Our relationship with Carroll has been just tweaking the operation," said Robert Wells, Ph.D., Noble Foundation livestock consultant. "He has a great deal of experience and knowledge. He was doing everything right. We're just helping him get there. It has been fun to work with somebody as business-minded and progressive as Carroll."

"Tweaking" is not the word Collier would use to describe his relationship with the Noble Foundation. He credits the organization's support and expertise with "100 percent, absolutely 100 percent" of his operation's success. "Oh, I think there is no way to set a value on working with the Noble Foundation," Collier said matter-of-factly. "It's just ►





everything about the relationship. From helping us manage the land to buying machinery, they are truly there to help."

Despite his extensive personal knowledge base, Collier still attends Noble Foundation workshops and seminars to brush up on new techniques and technologies. "I enjoy going to the seminars very much," he said. "Every time we go, we learn something new. You can always pick out something that works to your advantage."

Collier Farms is now hosting Noble Foundation field days designed to help other agricultural producers see a progressive, properly managed operation. "If you want to see a great farming operation that just does everything right," Wells said, "go visit Collier Farms."

#### **SUNRISE. SUNSET.**

During the tour of his farm, Collier spoke specifically about two tractors – one reclaimed from the past, one armed with futuristic technology.

Collier recently purchased a GPS system for his tractor. The GPS unit allows precision spraying so he can accurately

❖

**In August, the Noble Foundation selected Collier to receive the 2013 Leonard Wyatt Memorial Outstanding Cooperator Award, which honors a farmer or rancher who works with the organization.**

**Criteria for the Leonard Wyatt Memorial Outstanding Cooperator Award are based on accomplishments within the farmer's or rancher's operation, community service and willingness to assist other producers.**

apply fertilizer and insecticides. The technology helps reduce usage, save money and better manage pastures. "It's amazing how you can set the GPS and it will just carry you in a straight line," he said. "Every once in a while I think this thing can't be right. I get off the tractor and walk out there next to the tracks, and it is right on target. It makes the job a

whole lot easier." Of course, there is one more tractor that doesn't quite have all the modern bells and whistles, but holds great sentimental value. Collier takes a detour into his barn to discuss a particular family heirloom. There amongst the workbench and hay is a fire engine red 1947 Farmall tractor. His grandfather purchased the tractor for \$600 on July 7, 1947, to replace the team of horses used to plow the fields. Collier recently had the tractor restored to its original glory.

The tractor stands as a testament to the Collier family, linking progress of the past with the potential of the future. And the future seems to be on Collier's mind more and more.

After almost half a century, Collier is pondering retirement. "Your mind wants to do a lot, but your body won't let you," he said. He admits to slowing down during the heat of the day when the temperature soars. However, there are two parts of the day he never misses. "I like to see the sun going down, and I like to see it come up. Those are the most beautiful times of day."

Seems fitting – one sun fading into the past, one announcing the future. ■





Carroll Collier explains the use of a gate-hanging device that he invented.



Research Associate Josh Pittman drives a vehicle equipped with remote sensors to take forage measurements in a pasture.





# Live long and revolutionize forage measuring

**Remote sensing for pastures seems like science fiction, but Noble researchers are taking today's technology where it has never gone before**

*by Laura Beil*

If you grew up in the days of “Star Trek,” you know it wouldn’t be long into any episode before Dr. McCoy would pull out a tricorder, wave it in the direction of Captain Kirk and rattle off a laundry list of medical readings. (Followed by, “I’m a doctor, not a [fill in the blank].”)

The device was imaginary, but the concept couldn’t be more real – people

have long tried to perfect ways to gather data on subjects too inaccessible or too delicate to disturb. It’s called remote sensing, and it is the idea behind military satellite surveillance or sonar that explores the depths of the ocean floor.

Remote sensing also provides vital information about human food crops like corn, soybeans or grapes – from

harvest estimates to the levels of nitrogen or chlorophyll in the soil and leaves. Farmers have even used remote sensing for damage assessment after hailstorms. But, for all its potential, the technology has been largely overlooked for alfalfa, rye and other crops that sustain livestock. Remote sensing of forages hasn’t been seen as feasible or necessary. So most remote ►



Assistant Professor Mark Newell, Ph.D., (left) and Josh Pittman install a remote sensor on a new vehicle that will measure taller forages.

sensing of pastureland is still done the old fashioned way: ranchers relying on their eyes and years of experience.

But scientists from The Samuel Roberts Noble Foundation are working to bring remote sensing of forages into the 21st century. Not only could remote sensing be a tool for developing hardier lines of plants, but perhaps one day the technology could also supplement a rancher's judgment with something scientifically precise. "To me, it's a no brainer to use it," said Josh Pittman, a research associate in the Noble Foundation's forage agronomy laboratory and a Ph.D. candidate at Oklahoma State University (OSU).

At first glance, Pittman's remote sensing equipment looks a little like NASA meets the PGA: a TV-antenna-sized collection of instruments and cables mounted onto the front of a souped-up golf cart. As it drives along scanning the field, the sensors collect data about the chemical and physical properties of the plants around them. The sensors being used are all commercially available with some focused on similar applications in agriculture. The difference here is the use of multiple sensors in combination for a comprehensive on-the-go approach to data collection. This prototype system is unique to the Noble Foundation, but was born from collaboration.

## BRINGING IT ALL TOGETHER

In late 2011, Associate Professor Twain Butler, Ph.D., became aware of the use of sonar as a forage biomass estimation instrument. Butler and Pittman began to examine the various types of instruments used in industry and academia for remote chemical analysis and dimension measurement.

No single unit seemed to fulfill the pair's desired outcome – a comprehensive data collection unit. Thus, the idea was born to use numerous sensors simultaneously.

Pittman contacted Drs. William Raun and Brian Arnall, both with the Department of Plant and Soil Sciences at OSU.

Both professors are well known for their expertise in spectral sensing applications in agriculture. In fact, Raun was one of the original individuals involved with development of the GreenSeeker variable rate application technology. This system scans a plant to determine the amount of nitrogen it needs and applies fertilizer based on those readings.

Raun suggested a joint set of research projects between OSU and Noble, as well as the development of a doctoral program for Pittman, focused on integrating numerous sensors into a single system.

From this joint effort, Butler and Pittman reviewed OSU's equipment

to examine the utility and limitations Noble's project could encounter. The pair ran preliminary tests to evaluate what components to incorporate and which to leave out.

In February, Noble's efforts received a boost from an interaction with Jesse Poland, Ph.D., a research geneticist at Kansas State University. Poland provided counsel about certain components.

"Great ideas usually aren't born from one person," Pittman said. "In our case, we have a handful of outstanding minds, all supporting the development of this technology."

But what does this technology actually do?

In many ways, Pittman's remote sensing acts as a kind of CSI technology for plants. On television, detectives often use a device called a mass spectrometer.

The CSI team puts a sample into the machine, which then produces a big revelation about the evidence – this blood has sulfur in it! (And does so with remarkable speed; real life mass spectrometry takes much more time.)

Generally speaking, spectrometry identifies a substance by breaking down a sample into its basic molecular components and measuring how much of each component is present. It would be like an artist studying a shade of purple paint, trying to figure out the proportion of red, blue and other tints that created it.

The remote sensing Pittman uses is also an analysis of color; in this case, the wavelengths of light reflected off the leaves. Like mass spectrometry, it's a measurement based on the sum of its parts. If you're wondering what color says about the health of a field, think of an aerial view of a baseball diamond. One can tell a lot by the ratio of green grass in the infield and outfield to the brown, bare soil of the baseline.

In addition to the color of vegetation, remote sensing can also detect the location, temperature and height of plants. Ultimately, remote sensing systems record a huge volume of information for a relatively small area. The sensors on Pittman's prototype collect anywhere from 10 to 200 readings per second. The sheer volume of information creates a challenge for analysis after the fact, so resources at the Noble Foundation were tapped for a solution. Yinbing Ge, a software developer in the



Computing Services group at the Noble Foundation, worked with Pittman to develop a unique piece of software which enables the information from all of the sensors to come together seamlessly.

Most importantly, the technology does all of this without cutting a single stem.

## A SECOND NEW SYSTEM

Cutting is primarily the way scientists now measure a pasture's biomass or the amount of vegetation it contains (and one of the more important aspects to know about a field). Researcher Mark Newell, assistant professor at the Noble Foundation and a small grains expert, set up a series of sample plots 5 feet wide and 10 feet long, shortly after his arrival at Noble in 2012. His research goal is to find plants that are better able to withstand and recover from drought, grazing and other stresses.

The traditional way to calculate

biomass is to cut the field, allow the plants to dry and weigh the straw that remains. When the time came for Newell to collect data about his fields, he and his team began the process of clipping and drying. It was not long before he realized the process was way too slow. At the rate he was going, he wouldn't even be able to measure all of his experimental plots before the heat of summer started killing them off.

"After I got off the clipper, I thought, 'This isn't a good measurement of how much forage there is anyway,'" he said.

For one thing, a mowed field doesn't look like a grazed one. An animal will eat down to nubs no blade could ever touch. Clipping also doesn't allow scientists to measure the reseeding and regrowth time - because the crop you're trying to measure is gone. "Noble works on forage crops," he said. "If we can't accurately measure how much forage there is, that's not a good thing."

Newell is working on remote sensing technology that differs from Pittman's in at least one approach to design. Instead of a golf cart, Newell will use a tractor with a high axle and wheels that leave the field relatively undisturbed as it rolls through.

Once the scientists establish that the system works with good precision on the basics, they will start to see if it can obtain information now almost impossible to easily gather. Pittman envisions the day when ranchers can scan a field and use remote sensing to not only tell how much forage they've got, but what kinds of plants are in the mix, because each kind of crop has its own unique color signature.

And he says that science will soon come up with a smartphone app that could download the data from a remote sensor with a touch of the screen.

Still ideas in the making, but it would be the closest to a tricorder a rancher will ever get. ■



Josh Pittman calibrates remote sensors before taking forage readings in a research pasture.





Grasses and brush burn in a prescribed fire conducted by Noble Foundation staff.



# FUNDAMENTALS OF FIRE

## Burning questions about prescribed fire spark education, research at Noble Foundation

by Robyn Peterson

It is a late morning in southern Oklahoma, but the day is already just plain hot.

Temperatures have crossed the 90-degree barrier when a Noble Foundation prescribed burn crew arrives at the organization's Coffey Ranch for an afternoon that is about to get much hotter.

Water trucks are positioned and ready around the firebreaks. Drip torches are prepped and ready at the starting point. Soon a few small fires join together to become a smoldering line of fire. Recent rains have greened up the foliage, which now crackles and pops like Rice Krispies as the fire slowly ignites.

The crew pushes through the brush, setting the fire as they go. Charcoal smoke billows into the once clear blue

sky, and leaf debris falls like burnt paper.

Surrounded by the firebreak, the greenbrier thickets sizzle as the fire slowly fills the 5-acre tract. As a gentle breeze hits, the fire briefly swooshes through the brush. Winds play a key role in moving a prescribed burn through the brush. The progress of the fire, in part, corresponds to wind speed. Today the winds are mild and provide proper pace.

Thirty-five minutes later, the fire is out. The job is done. Weeks of planning culminate in a brief burn that serves as a reset button for the land.

A prescribed burn in the summer is somewhat uncommon for the Noble Foundation crew, who are slugging down cold water, but ongoing research has shown that summer burns can sometimes be more effective on brush control than burns at other times of the year.

Of course, they are also much hotter.

### WARMING UP TO FIRE

Prescribed fire (or controlled burning) is one of the most powerful and important land management practices available to native plant communities for wildlife habitat and livestock forage.

Benefits of prescribed fire have been well researched and documented. Burning helps manage native rangeland and wooded communities. It improves forage production for livestock and offers habitat management for wildlife. It controls unwanted invasive species encroachment, for example, Eastern Red-cedar, at a young stage and eliminates fuel build-up, such as dead grass, which reduces the risk of catastrophic wildfire. ►



A Noble Foundation technician lights dry grasses on fire using a drip torch.

"This region evolved with fire as a natural part of the ecological process, and it is necessary for keeping the land healthy and productive," said Steven Smith, Noble Foundation wildlife and fisheries consultant.

To increase hunting success, Native Americans used fire to attract grazing animals to specific areas. Fire was also heavily used in the eastern part of the U.S. long before European settlement. As the early settlers moved in, they began to eliminate the use of fire because there was no way to control it, which in turn created the negative perception that is associated with all fire today.

"It's like saying floods are bad, but obviously rain is not," said Russell Stevens, Noble Foundation wildlife and range consultant. "Wildfires are bad, but fire is not. People lost sight of that, simply due to fear of losing control. Prescribed fire is

still a serious management technique that requires timing, a plan and appropriate weather conditions."

In other words, you need a prescription.

### A PRESCRIPTION FOR HEALTH

A prescribed fire is a carefully planned, goal-oriented and – most of all – controlled process. Experts at the Noble Foundation explain that every prescribed burn should have a defined purpose and must meet numerous criteria before implementation.

Planning begins well in advance of striking a match and takes various factors into account, such as wind speed and direction, relative humidity, air temperature, smoke distribution, and firebreak and equipment preparation, among many safety protocols.

The most important aspect of a prescribed burn is a written burn

management plan (see pull box for additional information) which documents the specific elements necessary to safely conduct a prescribed burn. The plan essentially protects the burn crew and the surrounding property.

"If any part of the process does not fall into place for a particular burn and/or the risk is too high, knowledgeable landowners simply lay their plans aside for a better day and situation," Smith said.

The Noble Foundation started using prescribed burning on a regular basis in the early 1980s, mostly for wildlife habitat improvement and brush control.

In the 1990s, a Prescribed Burn Workshop was developed to provide knowledge to producers on the benefits and proper use of prescribed burning for land management. The workshop, which is held each January, is designed to introduce participants to the various aspects of burning; teach them how to conduct a safe burn; and give them hands-on experience in a controlled setting. The workshop also explains each piece of equipment used in a prescribed burn during the hands-on demonstration.

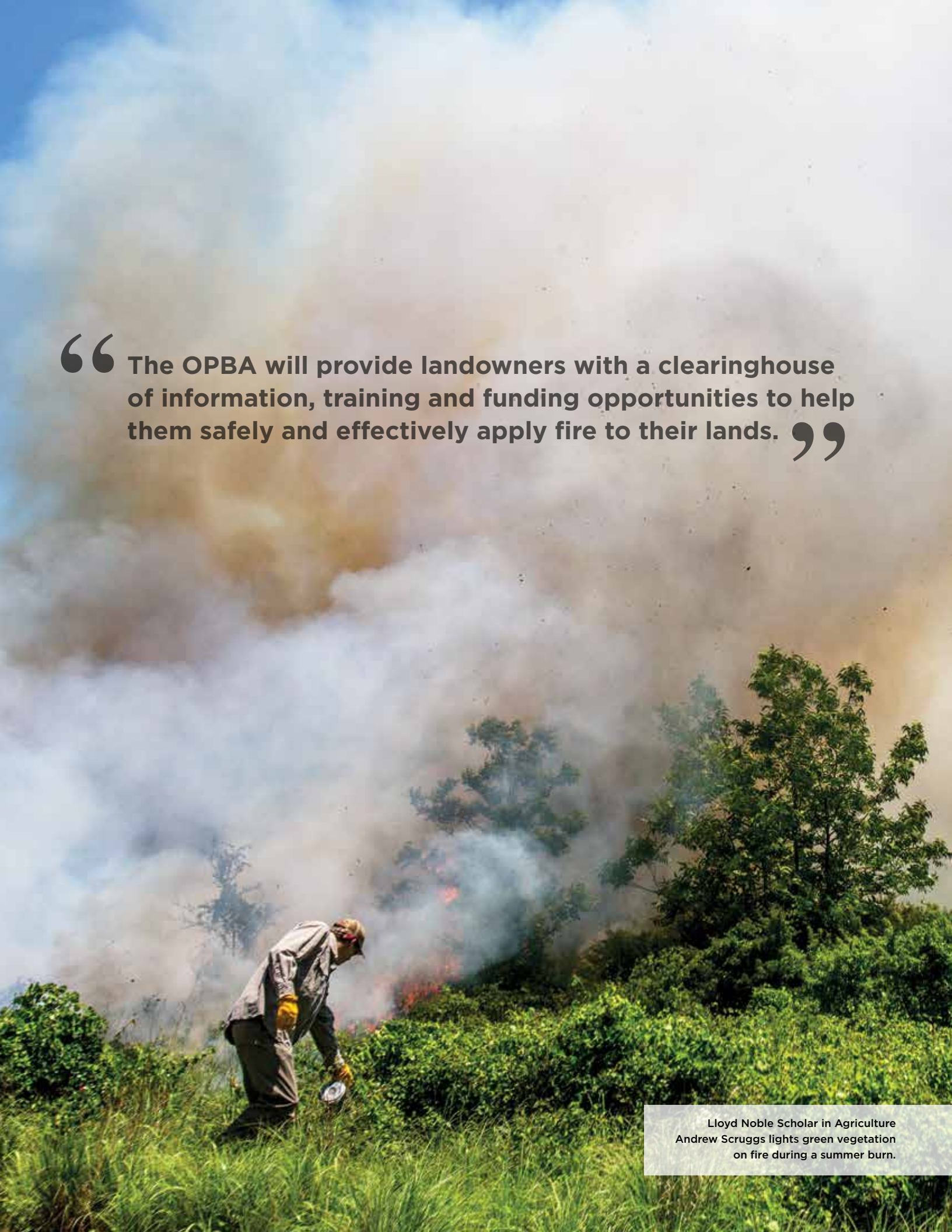
Noble Foundation wildlife consultants cover many aspects of conducting a prescribed burn, including legal and liability considerations. "Some landowners already use prescribed fire for accomplishing their management goals," Stevens said. "However, many still do not use this tool due to fear of liability as well as a lack of knowledge, labor and equipment. Solving knowledge, labor and equipment shortfalls goes a long way toward alleviating fear of liability."

### BURNING QUESTIONS

In 2009, members of Noble's Agricultural Division saw an opportunity for research and demonstration projects that would identify methods to improve the health of native range and determine the ecological and economic value of prescribed burns.

The researchers and consultants recognized that landowners often seek alternative ways of using their land, but, at the same time, they want to know how it affects their bottom line and the health of the resource. "Without proper management of their native range resources, producers may be faced with diminishing returns from beef cattle production, a ►



A firefighter in a grey uniform and yellow gloves is crouching in a field of tall green grass, holding a small metal container. In the background, there are green trees and a large, thick plume of white and grey smoke rising into the sky. The scene is set during a summer burn.

**“ The OPBA will provide landowners with a clearinghouse of information, training and funding opportunities to help them safely and effectively apply fire to their lands. ”**

Lloyd Noble Scholar in Agriculture  
Andrew Scruggs lights green vegetation  
on fire during a summer burn.

condition which may be exacerbated by range condition decline typically caused by overgrazing or brush encroachment,” Smith said. “Improvement of the range could increase the viability of a livestock operation. Additionally, wildlife habitat resulting from improved range conditions may provide viable alternatives to enhancing or supplementing returns while also supporting quality-of-life goals.”

One of the Noble Foundation’s research farms, the Oswalt Road Ranch, provided a unique opportunity to address these needs with a series of small- and large-scale research projects, including a 3,669-acre study designed to evaluate how prescribed burning affects stocker cattle production, herbaceous and woody species composition and growth, and land management economics on degraded rangeland.

“Much native range in the Southern Great Plains is presently stocked with cows at heavier than recommended rates, and range managers often do not incorporate fire into their management strategies,” Stevens said. “Ecologists consider prescribed fire integral to range health, so it is imperative we have the data to truly understand its impact on the producer’s bottom line.”

The project began in 2011 and will continue until 2020.

### FORMING A NEW TEAM

To further landowner education, the Noble Foundation entered into a strategic relationship in the spring of 2013 with the Oklahoma Prescribed Burn Association (OPBA) to advance the use of prescribed fire as a safe, economical and effective land management practice in Oklahoma.

The OPBA and the Noble Foundation, the largest independent nonprofit agricultural research organization in the United States, agreed that the Noble Foundation would provide essential support (resources and personnel) to enable the conduct of OPBA operations and programs. As part of this support, Stevens will serve as coordinator and acting head of the OPBA.

“The goals of the OPBA align with the Noble Foundation’s mission to promote responsible stewardship of the land,” Stevens said. “Prescribed

burns are vital to ensuring the health and vitality of our native rangeland and farmlands, and the OPBA is now poised to provide a comprehensive resource to our landowners.”

The OPBA was formally established as a nonprofit in early 2013 after two years of statewide meetings to gauge interest and garner support from all key organizations. The OPBA will establish, educate and assist a statewide network of local burn associations across Oklahoma. The new nonprofit will also serve to educate the public and policy-makers about the need to use prescribed fire and the safety of this management practice.

“The formation of the OPBA is one of the most important steps to help landowners reclaim the Oklahoma landscape naturally,” Stevens said. “The OPBA will provide landowners with a clearinghouse of information, training and funding opportunities to help them safely and effectively apply fire to their lands.”

The OPBA brings together dozens of organizations, including the Nature Conservancy, the Oklahoma Conservation Commission and its 88 local conservation districts, the Oklahoma Association of Conservation Districts, the Oklahoma Chapter of the National Wild Turkey Federation, Playa Lakes Joint Venture, Quail Forever, the Oklahoma Department of Wildlife Conservation, Oklahoma State University Extension, Oklahoma Tribal Conservation Advisory Council, the U.S. Fish and Wildlife Service, and the USDA’s Natural Resource Conservation Service.

“Collaboration is one of the keys to success,” Stevens said. “We have built a strong coalition of reputable organizations, all focused on improving the land and supporting landowners.”

Efforts are also underway to obtain affordable insurance for landowners who apply prescribed fire to their property. The OPBA can play a key role or perhaps even provide an avenue for insurance companies to provide insurance policies for prescribed burning.

“Fire is another tool in a land manager’s toolbox,” Stevens said. “With continued education and a network of support, prescribed fire can become a more common and properly used management technique.” ■

## BURN MANAGEMENT PLAN



A written burn management plan includes:

- The location and description of the burn site.
- A range of burn dates.
- Range of weather conditions under which the burn will be conducted.
- A map of the area with ignition sequence.
- A list of the burning crew.
- Emergency contacts.
- Equipment needs.
- A contingency plan in case fire starts outside the burn area.
- Identification and protection of smoke-sensitive areas outside the burn area.
- A list of adjoining landowners.

A notification plan should be submitted to the local and regional authorities.





Lucky Coffey, a senior from Tulsa's Edison High School, practices landscape photography at the Oklahoma Summer Arts Institute.

# The Future of Art

Oklahoma Summer Arts Institute is more than just a summer camp. Young artists hone their talents and discover possible careers, thanks in part to the Noble Foundation legacy of support.

*by Kim McConnell*



**T**his summer, Jakki Dameron pursued her passion and, in the process, defined her future.

Dameron, a resident of Tishomingo, Okla., is one of thousands of Oklahoma students who hone their artistic passions at the Oklahoma Summer Arts Institute (OSAI), a two-week residential arts academy held at Quartz Mountain State Park in southwest Oklahoma. Dameron, a 2013 high school graduate who attended OSAI in 2012 and 2013, was a choral music student who participated to learn more about her art, but came away with a firm idea of what she wanted to do as an adult. "OSAI definitely helped me find out what to do with my life," Dameron said. "I want to be a choir director."

Dameron said she had thought about making music her career, but she wasn't sure about it until she attended OSAI. The institute's goal is to offer gifted and motivated high school students the opportunity to study with artists in the fields of acting, ballet, modern dance, orchestra, drawing and painting, poetry, photography, film/video, and choral music – Dameron's choice.

"I learned so much about it," she said of her craft, adding that OSAI is successful because its students are completely immersed in their art medium for the entire

two weeks. "All you do is practice, practice, practice all day."

The intense opportunity and professional interaction are among the reasons that The Samuel Roberts Noble Foundation has supported OSAI since 1978, the year that the institute first made its home at the Quartz Mountain Resort Arts and Conference Center. Since its first grant of \$15,000 in 1978, the Noble Foundation has provided OSAI with 14 grants totaling \$712,500, including a \$7,500 grant awarded this year.

While OSAI does receive some funding from the state of Oklahoma, the bulk of its financial support comes from individuals and entities such as the Noble Foundation.

Julie Cohen, president and CEO of Oklahoma Arts Institute, said such support is crucial to OSAI's success and its arts programs. "Without it, we couldn't have OSAI at all," Cohen said. "We rely heavily on it. It's clear from our students and the impact on their lives that these funds are changing life directions."

Cohen said financial support from private donors allows the arts institute to handle normal operating costs and provide scholarships to students who attend. While the Noble Foundation has provided operating support in recent years, it established

an endowed fund in 1986 to support OSAI's orchestra program.

Cohen said that support has been instrumental in ensuring "that Oklahoma's most talented young musicians are able to come to Quartz Mountain each summer to play together in the institute orchestra."

Mary Kate Wilson, director of philanthropy, engagement and project management for the Noble Foundation, said that's exactly what the board of trustees had in mind when it began its long association with OSAI. "Oklahoma Summer Arts Institute offers a powerful program for promising artists across the state," Wilson said. "Not only does it give them a phenomenal experience, but oftentimes the students find possible outcomes that last a lifetime."

That's true. Just ask one of Oklahoma's future choral directors – Jakki Dameron. ■

**Above: Scott Parkman from Boston conducts the Oklahoma Summer Arts Institute Orchestra.**

**Right (top): Ballet students dance on the Quartz Mountain stage.**

**Right (lower left): Will Hedgecock and Caitlin Rose Morrison-Dyke act in the final Summer Arts Institute performance.**

**Right (lower right): Parents and students review a gallery of photos taken during the summer.**





# Living History

**Forget about learning dates. The Colonial Williamsburg Teacher Institute shows teachers how to bring history to life.**

*by Jessica Willingham*

A hush settles over Teri McDaniel's fifth-grade class as a document delicately makes its way from one set of hands to the next. Wide-eyed students examine the texture of the paper and one suspiciously large signature near the bottom of the page. McDaniel continues explaining the document's origin, its rebellious writers and the revolution that erupted

from one radical idea put on paper.

"Is this the real Declaration of Independence?" one student whispers in awe. McDaniel explains that it is simply a copy, made to look and feel like the original. Yet history has truly come alive in this moment for McDaniel's students. It lives and is relived every day in classroom 23.

Focusing on primary sources such as letters, financial records, bills of sale, journals of farmers and other replicated artifacts, students test theories and draw conclusions about the lives of those who built early colonial America. "They're scientists of history," McDaniel said. She teaches fifth grade in Madill, Okla., but was able to travel back to early colonial ►







Chance Johnson, an elementary student from Dickson, Okla., demonstrates blacksmithing during a history class.



Colonial Williamsburg actors in period clothing demonstrate a dance popular in the early days of America.

America, thanks to an educational program designed to make history education come alive.

The Noble Foundation and the Oklahoma Foundation for Excellence (OFE) have come together for the past 17 years to provide Oklahoma fifth-grade teachers the opportunity to attend the Colonial Williamsburg Teacher Institute at Colonial Williamsburg, Va. The Noble Foundation has given more than \$295,000 to fund attendance for Oklahoma educators. Because of the generosity of many donors, including the Noble Foundation, Oklahoma sends the most teachers to the institute per capita, with more than 700 teachers participating to date.

"The Noble Foundation has an extensive history of funding projects that support or enhance Oklahoma education and educators," said Mary Kate Wilson, director of philanthropy, engagement and project management at the Noble Foundation. "Our trustees take great joy in helping educators attend the Colonial Williamsburg Teacher Institute and watching them return to their classrooms energized and inspired to teach social studies. The students respond, and test scores reflect the impact of the experience."

### INVIGORATING EXPERIENCE

The joint effort between the organizations

is not an unlikely marriage. Just as the Noble Foundation is driven by founder Lloyd Noble's vision, the Oklahoma Foundation for Excellence continues to fulfill the vision of its founder, David L. Boren. Boren is a former Oklahoma governor and senator, and, during his term as governor of Oklahoma, he attended an event held to honor the successes of students and their educators across the state. It wasn't elaborate. It wasn't well attended. It wasn't grand. Boren believed public educators deserved more, so he gathered Oklahoma business owners, community leaders and private foundations to raise money for public educators and their programs.

"Our mission is to encourage academic excellence in public schools," said Brenda Wheelock, Oklahoma Foundation for Excellence communications director and liaison for early American history programs. "We began the program, and the ripple effect has been felt through generations of students and teachers across the state."

Wheelock attended the teacher institute in 2002 and describes the experience as career-altering, even spiritual, for educators.

"Many educators say the institute is the best professional development experience they've ever had and that they

learned more there than in college," she explained. "The institute doesn't change the way educators teach history, it changes the way they teach all subjects. They learn how to make lessons engaging, exciting, relevant and hands-on. They learn how to be a great storyteller and how to use primary sources. They come back with so many ideas. It invigorates them as teachers, and they realize what they can do with their students and all the possibilities in the classroom."

### EXPERIENCING EDUCATION

For one week each summer, teachers are immersed in the late 1700s, living in and learning from the time period and the people who lived it. They experience history viscerally and take that back to the classroom. Much like the first colonists of America, the teachers begin their journey in Jamestown, Va.

"We walked on the ships the first colonists came to America on, learning about the hardships they faced, like disease and starvation," said Jennifer Day, who has taught fifth-grade social studies for 17 years at Dickson public schools. "We walked through both Indian and English homes, learning about the real story of Pocahontas. It was amazing to stand on the same ground where the very first English colony was settled."





Bristin Davis molds clay art during a history class.



Craftsmen at Colonial Williamsburg build a carriage.

Teachers not only walked, but worked as if it were the 1700s. Stomping mud in a brickyard, grinding corn and picking bugs off tobacco leaves were all activities designed to push the educators even deeper into the time period.

Yet Oklahoma educators weren't the only ones uncovering history in Jamestown. The original colony is still a dig site, and teachers were able to meet with the chief archaeologist. Each teacher was given a stipend for supplies and was able to bring back replicas of agricultural tools and other artifacts found at the dig site, putting history in the hands of their students.

"History is a human thing," said McDaniel, back in her classroom. After introducing students to an artifact, she asks what students believe about the person who used or created it, and how they lived. "We are now teaching kids to connect on a level that asks 'How would I feel in that situation if I was a slave, a Native American, a loyalist, a farmer?'" Having been there inspires me to take children through lessons in the classroom."

While at the institute, educators also get to meet the colonists and Founding Fathers of America. Interpreters – people who study primary sources of historical figures, then develop a living character of

that person – spend the week with educators, telling stories and conducting trials and debates as both loyalists and patriots. With them, Oklahoma educators travel from Jamestown to Williamsburg and finally Yorktown – literally experiencing the journey of America's origin from the first colony to the final British surrender.

"We sat in the same room where our forefathers debated the loyalist/patriot cause," Day said. "We spent a day with an interpreter who acted as a leader in the army. He taught us how to march, carry our guns and fire."

The role interpreters played in bringing history to life inspired Day and McDaniel, along with hundreds of other Oklahoma educators, to become interpreters in the classroom. McDaniel is looking forward to studying a historic figure to create a character. The students will then use what they've learned to explore that character's social class, occupation and political affiliation. These methods are a long way from memorizing names and dates.

"There is a need for students to be taught in a way that is authentic," McDaniel said. "Where they are figuring things out on their own, opposed to being lectured. If you involve them in the subject matter, they learn authentically, and it's going to stick."

Many institute graduates report seeing

an increase in student interest, participation and academic performance after utilizing the methods taught at Colonial Williamsburg. The OFE is in the process of compiling a study to determine the rise in test scores correlated with methods taught at Colonial Williamsburg.

In Oklahoma, students are not tested in social studies until the fifth grade. The main focuses of the standardized test in social studies are called the "Common Core State Standards," which are focused on citizenship, college and career.

Based on those standards and the success of the Colonial Williamsburg Teacher Institute, the OFE began "Colonial Day at the Capitol" – a day for Oklahoma educators and their students to come to the state Capitol and experience colonial America much like the educators experienced the institute. Students and teachers dress in colonial era clothes, and professional interpreters – some from Colonial Williamsburg – come to speak and debate with students. Oklahoma is one of the only states in the nation to host this type of event.

"I am so grateful for the Noble Foundation that cares enough about Oklahoma educators to put forth the money to help us become better," McDaniel said. "The experience has changed how I teach." ■

# A Noble Journey

by J. Adam Calaway



“Africa changed my life.”

I’ve heard those words slip from the lips of a handful of my granola-eating, modern-music-loving friends who “find themselves” in places only Joseph Conrad dreamed of visiting. You know the places – where roads and clean water are still coming attractions.

Then it happened to me.

In May, I traveled to Uganda with Steve Swigert, a Noble Foundation agricultural economist, who has spent the last two years providing expert counsel to Watoto Childcare Ministries as they build a sustainable agricultural system to feed 3,000 orphans. (In the winter issue of *Legacy*, I’ll detail the Noble Foundation’s contribution to Watoto. Until then, check out my trip blog at [www.noble.org/blog/a-noble-journey](http://www.noble.org/blog/a-noble-journey).)

The process of traveling to Uganda, albeit uncomfortable at times, does not change you. Fill out passport forms. Get shots. Read horrifying Ugandan history. Pack multiple giant bags. Get a few more shots. Spend 20 hours on a plane with a screaming child. I’m still the same freckle-faced ginger, just sore and cranky. Then I landed.

Physically, the sights and sounds aren’t just foreign, they are otherworldly. The smooth concrete life of the United States, the order of our square wheat fields and the comfort of our city grids are replaced with what at first seems like chaos. The whirlwind of traffic draws you closer to God. The crush of people is

ever present. The country’s natural beauty (lush, rolling hills and valleys that lead to the shores of Lake Victoria) is juxtaposed by oppressive poverty.

Then you begin to adjust. You press ever so slightly into the rhythm of their life. For 10 days, I experienced Uganda, and it was redefining. Sunrises over Lake Victoria. Meeting the children at the Watoto villages. Driving past a seemingly endless valley of shanties and slums. Hearing the ladies at Living Hope sing. A boat ride to the mouth of the Nile River. Meeting an 8-year-old boy named Innocent who showed me the joy I had lost. Getting sick on Day 8.

I saw sites that I will never forget. I laughed harder than I have in years. I cried like a baby. Most of all, I fell in love with the Ugandan people. Despite decades of bloody revolution that claimed almost a whole generation, despite minimal resources, their love and generosity is boundless. They’ll give you what little food they have. No questions asked.

When I stood in the presence of such grace, when I fully comprehended the depth of need, when I shared that human connection, I was no longer allowed to ignore the reality that I was among the most blessed people on the planet. I am the blessed of the blessed, and then, like falling out of a tree, I experienced true humility.

On the plane ride home, I reflected on my 10 days, and I knew it without a doubt – Africa had changed my life. ■





Farmers harvest silage in September 1949  
at the Harold McCarthick Farm in  
Johnston County, Okla.



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Brian Williams, agricultural research assistant, picks up garbage at Lake Murray, which is south of Ardmore, Okla. Dozens of members of the Noble Foundation Employee Team join annually with other Ardmore organizations to clean the shoreline of the popular recreational lake.